CONTENTS

APPENDIX A DOE MODEL ELECTRICAL SAFETY PROGRAM

(THE "DOE MODEL ELECTRICAL SAFETY PROGRAM" WAS CREATED AS OF THE RESULT OF REQUIREMENTS FROM "REPORT OF THE TASK GROUP ON ELECTRICAL SAFETY OF DEPARTMENT OF ENERGY FACILITIES", JANUARY 1993, DOE/EH-0298)

EXECUTIVE SUMMARY

The Task Group on Electrical Safety of Department of Energy Facilities, in its January 1993 report, described a Model Electrical Safety Program. This concept has been expanded from its original narrative form into more detailed guidelines, drawing upon the electrical safety program of the Sandia National Laboratory for additional material. This model program is offered to the entire Department of Energy (DOE) complex as guidance to assist in developing and maintaining an effective and sound electrical safety program to ensure the safety and well being of all DOE, including contractor, and subcontractor employees working within any DOE site or facility. The model program has been designed to address the major areas of concern identified by the Task Group.

In essence, an Electrical Safety Program for protecting DOE and contractor workers and facilities should be founded firmly on established requirements of OSHA's electrical safety regulations in 29 CFR 1910 and 29 CFR 1926, National Electrical Code (NEC), DOE Orders and applicable state, local, mine, and tunnel safety standards. This program should establish an electrically safe workplace—free from recognized electrical hazards for all employees. Management should commit to involvement at all levels based on familiarity with the requirements.

Each site should establish an electrical safety committee and designate an Authority Having Jurisdiction (AHJ) for interpreting the electrical requirements of OSHA, NEC, and other standards applicable to the site or its facilities. All personnel engaged in electrical work should be trained to have knowledge and understanding of electrical safe work practices. Appropriate electrical testing equipment and personal protective equipment should be provided, properly maintained and used.

A proactive preventive maintenance and inspection program for electrical systems and equipment should be in place and staffed by qualified electricians.

All electrical equipment purchases should meet appropriate codes and electrical safety requirements, as determined by a nationally recognized testing laboratory or as approved by the AHJ.

Before a site can have a successful electrical safety program, a continuous improvement effort and commitment must be clearly understood and shared throughout the site.

Each facility must demonstrate continuous improvement for design, construction, operation, maintenance and revisions at the site. Improvements must be tested against changing codes and regulations as they are made.

The ten principles of personal safety are as follows:

1. Plan every job—Planning is the key to preventing incidents therefore, eliminating injuries.
2. Anticipate unexpected events—If a person thinks about what can go wrong and does something about it, then a potential incident can be prevented.
3. Use the right tool for the job—Each employee must make sure that the correct tool is used and management must make sure the correct tool is available.

4. Use procedures as tools—Even though procedures are only paper or text, they should be viewed as tools to prevent injury.
5. Isolate the equipment—The best way to avoid accidental release of energy is by isolating the equipment before starting the job (lockout/tagout).
6. Identify the hazard—Employees who are exposed or potentially exposed must be able to recognize when and how they are exposed. Management has the responsibility to provide training to deal with each known hazard, as required.
7. Minimize the hazard—Take all known steps to minimize each hazard and the exposure to each known hazard.
8. Protect the person—The last chance to avoid an injury is to wear personal protective equipment (PPE). Each person must use all protective equipment that is needed. It is management's responsibility to provide all appropriate PPE.
9. Assess people's abilities—Knowledge and ability help prevent injuries. Each person must recognize their limitations whether physical, mental or emotional. Management must also recognize the same limitations.
10. Audit these principles—The audit should validate the principles related to the people, task, and work environment. It should gauge the visibility of the principles in actual behavior.

The six basic elements of an effective Electrical Safety Program are listed below.

- Management must have complete commitment to the program;
- Effective training for all degrees of hazard and a baseline for training must be established;
- Effective and complete safe electrical work practices must be established;
- Documentation must be kept for all activities;
- Electrical safety engineering support must be made; and
- Oversight for the electrical safety program must be established, also.

The model program described in the following pages is presented in terms of purpose, scope, and ownership; performance objectives; responsibilities, authorities, and interfaces; definitions, and implementation guidance. References are listed for more in-depth guidance. A model Charter of the Electrical Safety Committee is provided as an appendix.

1. PURPOSE, SCOPE, AND OWNERSHIP

1.1 PURPOSE

The purpose of an electrical safety program is to

- promote an electrically safe workplace free from unauthorized exposure to electrical hazards for all employees and contractors;
- provide direction to implement electrical safety requirements of Department of Energy (DOE) orders, criteria, and guides. (See Section. 6, References); and
- achieve compliance with Occupational Safety and Health Administration (OSHA) regulations in accordance with DOE orders.

An electrically safe workplace will be achieved by

- mandating and implementing the electrical subparts of Title 29 Code of Federal Regulations 29 CFR 1910 and 29 CFR 1926 as directed by the Secretary of DOE and OSHA; and
- applying the National Electrical Code [National Fire Protection Association (NFPA 70)] and any exceptions by applicable state or local municipal requirements to the design, construction, and maintenance operation of facilities and research and development of electrical/electronic systems.

1.2 SCOPE

The Electrical Safety Program shall apply to all site organizations. These organizations shall conform to

- the host's site electrical safety requirements, and
- the local, city, county, or state jurisdiction.

1.3 OWNERSHIP

Site management shall appoint an organization to be owner of the Electrical Safety Program.

The Electrical Safety Program governs:

- the electrical safety program owned by each department. The departments will develop and implement safe operating procedures specifically applicable to special electrical hazards in their workplaces.

2. PERFORMANCE OBJECTIVES

The Electrical Safety Program has the following objectives.

Establish an effective electrical safety program by

- establishing the authority having jurisdiction (AHJ) for interpreting OSHA, NFPA 70 and other requirements for electrical work;
- establishing requirements and controls for implementing the program;
- providing guidance to all departments, which includes developing and implementing safe operating procedures with electrical requirements;
- developing an Electrical Safety Program self-assessment process;
- establishing measurement criteria and documentation for self-assessment of the Electrical Safety Program;
- evaluating the Electrical Safety Program on an annual basis to be followed by action plans in response to findings; and
- evaluating each department against the requirements.

Ensure a safe workplace with the lowest reasonable risks from electrical hazards by

- establishing training programs for qualified and unqualified worker requirements and safe work practices for all personnel engaged in electrical work in accordance with 29 CFR 1910.331-335;
- complying with all applicable electrical requirements of
- 29 CFR 1910 and 29 CFR 1926;
- the NFPA;
- American National Standards Institute (ANSI-C2), the National Electrical Safety Code (NESC);
- DOE orders; and
- state, county and local revisions of the preceding requirements;
- requiring the development and maintenance of an Electrical Safety Program; and
- allocation of resources for implementing this program.

3. RESPONSIBILITIES, AUTHORITIES, AND INTERFACES

3.1 MANAGEMENT

Management ensures that the Electrical Safety Program is integrated into an overall Environmental, Safety, and Health (ES&H) program, selects the Electrical Safety Committee Chair, and approves the committee's charter.

3.2 ES&H MANAGERS

ES&H managers provide oversight for implementing the Electrical Safety Program.

3.3 ELECTRICAL SAFETY COMMITTEE

The Electrical Safety Committee (ESC) should act as the AHJ for interpreting electrical codes and regulations.

The ESC

- presents management with the requirements and training needed to implement the program;
- advises management of the need to fund and support these requirements;
- maintains and assists in the implementation of the Electrical Safety Program;
- develops and maintains the electrical safety manual;
- assists the departments by interpreting the electrical requirements of DOE orders, criteria, and guides and other codes, standards, and practices;
- maintains a copy of each interpretation given; and
- publishes electrical safety bulletins.

The committee interfaces with DOE, all organizations and sites, and other DOE contractors.

3.3.1 ESC SUBCOMMITTEES

The ESC subcommittees address site-wide electrical safety issues and may be comprised of ESC members as well as non-Electrical Safety Committee members. The electrical chair appoints subcommittee chairs, who are not required to be members of the ESC. All subcommittee reports and recommendations are approved by a majority of the ESC.

3.4 MAINTENANCE MANAGERS

Maintenance managers implement the Electrical Safety Program by developing an electrical preventative maintenance program and providing qualified electricians. They also ensure that managers, first line supervisors, and a staff of crafts workers and their assistants complete all applicable courses of electrical safety training. Maintenance managers also ensure that all facilities are maintained in compliance with NEC (NFPA 70) and the NESC (ANSI-C2).

3.5 FACILITY OPERATIONS AND MAINTENANCE DEPARTMENT MANAGERS

Operations managers are responsible for implementing the Electrical Safety Program by providing safe work procedures and permits for high and low voltage work as required. They also provide and

implement other critical procedures such as lockout/tagout, testing, and safety-related work practices as required by 29 CFR 1910.331-335. These managers ensure that crafts workers of all disciplines and their immediate supervisors working with, or in proximity to, electrical equipment receive

- electrical safety awareness training;
- general and job-specific training in safe electrical work practices as required in 29 CFR 1910, Subpart S; and
- training in NFPA and ANSI codes and standards.

3.6 FACILITY ENGINEERING DESIGN DEPARTMENT MANAGERS

Facility engineering managers are responsible for implementing requirements of this Electrical Safety Program during facility design by ensuring compliance with DOE Order 6430.1A "General Design Criteria." These managers also ensure that the electrical engineers and designers attend

- electrical safety awareness training;
- general and job-specific training in safe electrical work practices as required in 29 CFR 1910, Subpart S; and
- training in NFPA, IEEE, and ANSI codes and standards.

In addition, they also ensure that all workplace modification designs are in compliance with 29 CFR 1910, Subpart S, and NFPA 70E. They also provide and maintain up-to-date electrical drawings to adequately describe the various building systems and modifications.

3.7 CONSTRUCTION MANAGERS

Construction managers are responsible for implementing and enforcing the requirements of NFPA 70, ANSI C2, and OSHA 29 CFR 1926 during construction of all facilities by providing AHJ-approved certification for electrical inspectors. They also ensure that the inspectors receive training in NFPA 70, OSHA 29 CFR 1926, ANSI C2, and electrical safety awareness.

3.8 SAFETY ENGINEERING MANAGERS

Safety managers provide oversight and customer liaison for electrical safety for the departments. They also provide cognizant electrical safety professionals trained in the application of NEC, OSHA, etc.

3.9 DEPARTMENT MANAGERS

Department managers are responsible for implementing Section 5 of this Electrical Safety Program in their departments by:

- identifying electrical hazards and documenting them within their departments,
- familiarizing personnel with electrical hazards,

- developing and implementing safe operating procedures to ensure safe electrical work practices that mitigate the risks of electrical hazards,
- developing and implementing an action plan for documenting and correcting electrical deficiencies,
- conducting periodic inspections of their workplaces and electrical equipment,
- conducting safety meetings that include electrical safety topics,
- ensuring that personnel receive Electrical Safety Awareness Training and other task specific electrical safety training as required by 29 CFR 1910.332,
- ensuring that their contractors comply with the requirements of this program as applicable, and
- developing interfaces with their representatives on the ESC.

3.10 EMPLOYEES, VISITORS, ON-SITE CONTRACTORS AND SUBCONTRACTORS

All employees and on-site contractors are responsible for:

- having an awareness of the electrical hazards in their workplaces;
- reporting electrical occurrences, shocks, and discovered hazards;
- reporting all electrical shocks as injuries to the Health Services Department;
- reading, understanding, and following applicable safe operating procedures having electrical requirements;
- adopting and implementing safe electrical work practices;
- attending appropriate Electrical Safety Awareness Training and other equivalent job-specific training as required by 29 CFR 1910.332;
- using appropriate personnel protective equipment; and
- developing interfaces with their representatives on the ESC.

3.11 PURCHASING MANAGERS

Purchasing managers are responsible for specifying that, when available, purchases of electrical equipment and appliances are listed by a nationally recognized testing laboratory (NRTL) such as Underwriters' Laboratories, Inc., (UL).

3.12 ES&H TRAINING MANAGER

These managers are responsible for developing and overseeing electrical safety training courses, including any site-specific electrical safety training courses, as required by the ESC and the Electrical Safety Program.

4. DEFINITIONS

Authority Having Jurisdiction (AHJ)

Interprets the requirements of the National Electrical Code (NFPA 70); the National Electrical Safety Code (ANSI C2); 29 CFR 1910, Subpart S; 29 CFR 1926, Subparts K and V; and DOE Order 6430.1A, "General Design Criteria." Approves electrical equipment, wiring methods, electrical installations, and utilization equipment for compliance. Coordinates these functions with ES&H management and the DOE area or field office.

Approved

Acceptable to the AHJ.

Appliance

Utilization equipment, generally other than industrial, normally built in standardized sizes or types, that is, installed or connected as a unit to perform one or more functions such as refrigerators, air conditioning, and so forth.

Electrical Shock, Reportable

Any electrical shock is classified as an injury and must be reported immediately to health services and supervision.

The employee must not attempt to evaluate the severity of the shock or its effects without medical consultation.

Equipment

Material, fittings, devices, appliances, fixtures, apparatus, and so forth, used as part of, or in connection with, an electrical installation.

Examination

Examination process described in 29 CFR 1910.303(b)(1), "Examination", and NFPA 70, Article 110-3, "Examination, Identification, and Use for Equipment". These examinations are performed by a qualified person to ensure that electrical equipment is free from recognized hazards that are likely to cause death or serious physical harm.

Equipment, Utilization

Equipment that uses electrical energy for electronic, electromechanical, chemical, heating, lighting, or similar purposes.

Labeled

Equipment or materials to which a label, symbol, or other identifying mark has been applied by an NRTL.

Listed

Equipment or materials included in a list published by an NRTL

Nationally Recognized Testing Laboratory (NRTL)

An organization acceptable to the AHJ and concerned with product evaluation that maintains periodic inspection of production of listed equipment and materials. The NRTL ensures that the equipment or materials meet appropriate designated standards or have been tested and found suitable for use in a specified manner. (Refer to 29 CFR 1910.7 "Definition and Requirements for a Nationally Recognized Testing Laboratory.")

Personnel

Employees and on-site contractors.

Qualified Personnel

Personnel trained and familiar with the construction and operation of electrical systems and equipment and their associated hazards. (Refer to 29 CFR 1910.399, "Definitions", Qualified Person, Notes 1 and 2.)

Qualification Requirements for AHJ Inspectors

Current AHJ recognized electrical inspection certification, or AHJ-approved education and experience in applying the requirements contained in NFPA 70; ANSI C2; 29 CFR 1910, Subpart S; 29 CFR 1926, Subparts K and V, and DOE Order 6430.1A, General Design Criteria.

NOTE: AHJ inspectors derive their authority from and coordinate their interpretations through the ESC.

5. IMPLEMENTATION GUIDANCE

5.1 INTRODUCTION

The objective of this section is to provide multilevels of management with the criteria to implement this Electrical Safety Program in their organizations. To achieve this objective, managers and ES&H coordinators should

- identify electrical hazards in their workplaces;
- familiarize personnel with these electrical hazards;
- develop and implement safe operating procedures to ensure safe electrical work practices that mitigate the risks of electrical hazards;
- conduct periodic inspections of their workplaces and electrical equipment;
- develop and implement an action plan for documenting and correcting electrical deficiencies, and
- ensure that personnel receive Electrical Safety Awareness Training and other job-specific electrical safety training as required by 29 CFR 1910.332.

Involving all employees and on-site contractors in the electrical safety process is essential to ensure successful implementation of this program.

5.2 ADMINISTRATION AND SAFE CONDUCT OF ELECTRICAL WORK

Performance Objective:

Minimize personnel exposure to electrical hazards.

To ensure the safe conduct of electrical work, each organization must

- define, establish, and understand individual accountabilities, authorities, interfaces, roles and responsibilities;
- properly allocate resources to satisfy requirements;
- establish administrative controls and procedures to meet the hazard assessment and work practices of 29 CFR 1910.331-335;
- establish procedures to ensure proper review, approval, work authorization, oversight and documentation for electrical work;
- conduct safety meetings on job-related electrical issues; and
- implement 29 CFR 1910.333 lockout/tagout requirements and procedures.

Electrical safety related work practices will be implemented by each organization in accordance with 29 CFR 1910 as amended in August 1991:

- 1910.331, Qualified and Unqualified Employees
- 1910.332, Training
- 1910.333, Selection and Use of Work Practices
- 1910.334, Use of Equipment
- 1910.335, Safeguards for Personnel Protection

5.3 TRAINING

Performance Objective:

Establish qualification requirements, training programs and certifications where appropriate for all personnel.

Prior to performing electrical work, personnel must be qualified to perform job-related electrical tasks as required by 29 CFR 1910.332.

Personnel exposed to the presence of voltages of 50 V or more will have formal electrical safety awareness training. This training can be in a classroom or on the job.

All training must be documented.

- Instructors must provide course outlines.
- Proof of successful completion must be maintained in appropriate files.

Minimum training requirements should include

- electrical safety awareness;
- electrical safety theory;
- applicable codes, DOE orders, regulations, and standards;
- demonstrations and hands-on practice;
- use and care of personal protective equipment;
- job-specific safe electrical work practices; and
- electrical requirements of safe operating procedures and operating procedures.
- Personnel working with high voltage (greater than 600 V) must have specialized electrical awareness training.
- Periodic training refresher courses are required to maintain and update skills and code requirements.

Management and supervision who oversee electrical work must have completed Electrical Safety Awareness Training at a level commensurate with the level of work being performed.

5.4 PERSONAL PROTECTIVE EQUIPMENT

Performance Objective:

Provide personal protective equipment for electrical work. Establish documented procedures for its use, care, maintenance, and testing. [Guidance for these procedures can be found in 29 CFR 1910.137 and 29 CFR 1910.268(f).]

Managers shall ensure that adequate resources are available to provide personal protective equipment in compliance with applicable codes and standards. In addition, they shall ensure that:

- personnel are trained in its use in accordance with documented procedures;
- procedures are established and implemented for documented controls of protective equipment such as inventory, storage, maintenance, and testing;
- protective equipment requirements and usages are specified in the safe operating procedures;
- protective equipment is inspected prior to each use;
- high-voltage equipment is inspected prior to each use according to appropriate recognized standards and
- grounding equipment, cables, clusters, and sticks, are inspected annually and prior to each use.

5.5 ELECTRICAL PREVENTIVE MAINTENANCE (EPM) PROGRAM

Performance Objective:

Establish an electrical preventative maintenance program to ensure safe and reliable operation of electrical wiring, protection devices, and operating equipment such as switches, circuit breakers, utilization equipment, and appliances.

Managers will ensure that adequate resources are available to provide for compliance with applicable codes and standards. In addition, they will ensure that:

- procedures are established for EPM intervals, inspections, tests, and servicing requirements;
- records are maintained of all tests, inspections, servicing, and inventories;
- documentation, tests, test intervals, and procedures are guided by the recommendations of NFPA 70B, manufacturer's recommendations, industry standards, or DOE-adopted standards or regulations;
- copies of all manufacturer's installation, operating, and maintenance instructions are maintained in a department file; and
- EPM work is performed only by qualified personnel.

5.6 CODE COMPLIANCE

Performance Objective:

Ensure compliance with all applicable electrical requirements of DOE Orders, the NFPA, ANSI C2, and the respective parts of 29 CFR 1910 and 29 CFR 1926.

All electrical installations and equipment are subject to inspection and the approval of the AHJ.

5.6.1 CODE AND REGULATION INSPECTORS

Inspectors representing the AHJ will be qualified as required by the AHJ in:

- National Electrical Code (NFPA 70);
- 29 CFR 1910, Subpart S; and
- 29 CFR 1926, Subparts K and V.

Managers will ensure that adequate resources are available to provide for compliance with applicable codes and standards. In addition, they will ensure that:

- Inspections are performed by qualified personnel on all new electrical work and equipment, including utilization equipment. These inspections will be in accordance with 29 CFR 1910, Subpart S.

- Any potential imminent danger situation is corrected immediately or personnel is removed from the hazard.
- Resources are available to abate all true electrically hazardous conditions.
- Inspections are documented. Inspection records, deficiencies, and corrective actions will be maintained in a department file.
- Examinations are performed on all equipment that is not listed or labeled by a NRTL.
- Record drawings of all electrical systems and equipment are maintained and a rigid system exists for recording changes and correcting the drawings to reflect those changes.

5.6.2 AUTHORITY HAVING JURISDICTION (AHJ)

The ESC is the AHJ for interpreting electrical codes, standards, and regulations.

5.6.3 EXEMPTION AND WAIVERS

All requests for code and regulation exemptions and waivers will first be submitted to the ESC for action.

Requests for exemptions and waivers will include:

- a description of the problem and the reason for requesting noncompliance;
- code or regulation references;
- proposed mitigative steps to be taken such as warning signs, barriers, and procedures to provide equivalent protection; and
- proposed dates for the variance.

Normally, exemptions and waivers are not granted for 1) longer than 180 days, 2) the time it takes to correct the deficiency, or 3) the duration of an approved program or operation. (See Section 4.0, Definitions). Exemptions and waivers are granted by the DOE Assistant Secretary for Environment, Safety, and Health in accordance with DOE Document DOE/ID-10600.

5.6.4 EQUIPMENT AND MATERIALS APPROVAL

All electrical equipment and materials for facility wiring, and similar R&D wiring, as defined by NFPA 70 will be approved in accordance with Article 90-7, “Examination of Equipment for Safety,” and Article 110-3, “Examination, Identification, Installation, and Use of Equipment.”

5.6.5 UTILIZATION EQUIPMENT

Utilization equipment is addressed in 29 CFR 1910.302 and 303. This document makes it clear that utilization equipment is subject to the same approval and acceptance requirements as in Section 5.6.4 of this document.

- To be acceptable for installation and use, utilization equipment will be listed or labeled by a NRTL.
- Utilization equipment that is not listed or labeled will meet one of the requirements of 29 CFR 1910.399, Acceptable, (i)(ii), or (iii).
- Utilization equipment that is not listed or labeled will be examined, accepted, and documented by a qualified person.
- Utilization equipment must be used in accordance with its listing and labeling requirements.

  NOTE: Utilization equipment includes laboratory and shop equipment, appliances, or other devices that operate from an electrical energy source.

5.6.6 TEST INSTRUMENTS AND EQUIPMENT

Test instruments and equipment are intended only for use by qualified personnel and shall be used in accordance with 29 CFR 1910.334(c). In addition, a qualified person will inspect all test instruments and equipment to ensure that it is safe to use as intended by the manufacturer. If found unsafe, they will not be used unless warning labels, special operating procedures, or modifications are used to mitigate the hazard.

- Test instruments and equipment will be visually inspected before each use.
- Test instruments and equipment and their accessories shall be electrically rated for their intended use.

5.6.7 EQUIPMENT OF FOREIGN MANUFACTURE

All equipment of foreign manufacture is subject to acceptance as defined in 29 CFR 1910.399. Listing and labeling of equipment by foreign laboratories or standards may require examination to ensure that the equipment is wired to the electrical requirements of NFPA 70 as well as 29 CFR 1910.334.

5.6.8 APPLIANCES FOR PERSONAL USE

All appliances for personal use in the workplace such as coffee pots, refrigerators, and radios should be listed and exhibit the label of a NRTL.

5.6.9 QUALIFIED EXAMINERS OF RESEARCH AND DEVELOPMENT (R&D) EQUIPMENT

R&D managers may appoint at least one person in their organization to examine equipment and materials for approval prior to use. This person(s) will be knowledgeable in specified code and regulation requirements for examination and with the NRTL process. This person will contact an electrical safety staff member for guidance in examination procedures.

NOTE: If an organization does not have a qualified person, an electrical safety staff member should be contacted for assistance.

5.7 ENGINEERING AND INSPECTION

Performance objective:

Provide electrical safety engineering and inspection resources to ensure that this Electrical Safety Program and all mandatory codes and regulations are implemented.

5.7.1 R&D AND FACILITY REQUIREMENTS

R&D and facility organizations will ensure that their electrical systems are constructed and maintained in compliance with the electrical safety criteria.

5.7.2 CERTIFIED ELECTRICAL INSPECTORS

Certified (AHJ-approved certification) electrical code inspectors will be provided for construction and maintenance work.

Inspectors

Inspectors will have an AHJ-approved certification in the National Electrical Code and will be qualified in the electrical safety requirements of 29 CFR 1910 and 29 CFR 1926. In addition, inspectors will

- have the responsibility of inspecting electrical work performed during both maintenance projects and construction projects;
- provide documentation of electrical inspections of both maintenance projects and construction projects;
- participate in the quality assurance QA process and QA review process;
- provide an inspection resource for all organizations;
- participate in the QA programs of other organizations as required, and
- review and sign off on safe operating procedures with electrical requirements.

5.7.3 QUALIFIED PERSONNEL

All persons performing electrical work will be qualified in accordance with the requirements of 29 CFR 1910.331 through 335. Electrical work will be performed by qualified personnel as follows.

Connection to and operation of circuit breakers in building electrical panels may be performed only by qualified electricians.

NOTE: In an emergency, a knowledgeable employee may operate a circuit breaker in a building only to disconnect power

- Power cords and plugs, rated 15 or 20 A, provided with electrical equipment and intended to be installed by the user, will be installed by a qualified person. The manufacturer's

instructions will be followed explicitly. A polarity and ground continuity test will be performed on the cord and plug set before inserting the plug into a receptacle.

- All other electrical work will be performed by qualified electronic technicians and electricians.

5.7.4 QUALITY ASSURANCE (QA)

Qualified personnel will participate in the QA process and provide design input and oversight as follows.

- Review electrical plans for all new, or modifications to, facilities and R&D projects.
- Review safe operating procedures for Electrical Safety Program compliance.
- Periodically inspect wiring materials, connections, and components of existing facilities and R&D projects.
- Review drawings, specifications, and manufacturer's installation operation instructions for all electrical equipment prior to connection and operations

5.7.5 ELECTRICAL OCCURRENCE REPORTS

Electrical occurrences, including electrical shocks, shall be reported in accordance with DOE Order 5000.3A.

6. REFERENCES

6.1 IMPLEMENTING REFERENCES

29 CFR 1910, Subpart S, and 29 CFR 1926, Subparts K and V.

DOE Electrical Safety Guidelines, DOE/ID 10600.

Electrical Safety Criteria for Research and Development Activities, DOE/EV-0051/1, Interim Criteria.

Electrical Safety Task Force Report.

Factory Mutual Approval Guide.

Factory Mutual Data Sheets.

General Design Criteria, DOE Order 6430.1A.

International Association of Electrical Inspectors, Inc. (IAEI).

International Congress of Building Officials (ICBO).

Institute of Electronic and Electrical Engineers (IEEE).

National Electrical Code, National Fire Protection Association 70.

National Electrical Safety Code, American National Standards Institute standard C2.

National Fire Codes, National Fire Protection Association (NFPA). (Refer to Section 6.3.)

Standard for Fire Protection of DOE Electronic Computer/Data Processing Systems, DOE/EP-0108.

Underwriters Laboratories, Inc., Listings and Classifications Directory.

Uniform Building Code. latest edition and supplements.

Uniform Fire Code, latest edition and supplements.

Williams-Steiger Occupational Safety and Health Act of 1970, standards:

- Occupational Safety and Health Standards, 29 CFR 1910, General Industry Standards.
- Safety and Health Regulations for Construction, 29 CFR 1926.

6.2 DEVELOPMENTAL REFERENCES

Conduct of Operations Requirements for DOE Facilities, DOE Order 5480.19.

Environmental Protection, Safety, and Health Protection Information Reporting Requirements, DOE Order 5484.1.

Environmental Protection, Safety, and Health Protection Standards, DOE Order 5480.4.

Fire Protection, DOE Order 5480.7.

General Design Criteria, DOE Order 6430.1A.

General Operations Quality Assurance, Revision II, DOE/AL Order 5700.6B.

Occurrence Reporting and Processing of Operations Information, DOE Order 5000.3A.

Maintenance Management Program, DOE Order 4330.4A.

Maintenance Management Program Guidance, DOE/AL 4330.4A.

Protection of Electronic Computers and Data Procession Equipment, DOE/EP-0108.

Safety Analysis and Review, DOE Order 5481.1B.

6.3 NFPA REFERENCES WITH ELECTRICAL REQUIREMENTS

Volume 1

1 Fire Prevention Code
20 Standard for the Installation of Centrifugal Fire Pumps
30 Flammable and Combustible Liquids Code
30A Automotive and Marine Service Station Code

Volume 2

33 Standard for Spray Application Using Flammable and Combustible Liquids
34 Standard for Dipping and Coating Processes Using Flammable or Combustible Liquids
45 Standard on Fire Protection for Laboratories Using Chemicals
50 Standard for Bulk Oxygen Systems at Consumer Sites

50A Standard for Gaseous Hydrogen Systems at Consumer Sites
50B Standard for Liquefied Hydrogen Systems at Consumer Sites
54 National Fuel Gas Code
58 Standard for the Storage and Handling of Liquefied Petroleum Gases
69 Standard on Explosion Prevention Systems

Volume 3

70 National Electrical Code (NEC)
70B Electrical Equipment Maintenance
70E Standard for Electrical Safety Requirements for Employee Work Places
72A Standard for the Installation, Maintenance, and Use of Local Protective Signaling Systems for Guard's Tour, Fire Alarm, and Supervisory Service
72B Standard for the Installation, Maintenance, and Use of Proprietary Protective Signaling Systems
72E Standard on Automatic Fire Detectors
72F Standard for the Installation, Maintenance, and Use of Emergency Voice/Alarm Communication Systems
75 Standard for the Protection of Electronic Computer/Data Processing Equipment
78 Lightning Protection Code
79 Electrical Standard for Industrial Machinery

Volume 4

88B Standard for Repair Garages
90A Standard for the Installation of Air Conditioning and Ventilation Systems
90B Standard for the Installation of Warm Air Heating and Air Conditioning Systems
91 Standard for the Installation of Blower and Exhaust systems
96 Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment

Volume 5

99 Standard for Health Care Facilities
99B Standard for Hypobaric Facilities
101 Code for Safety to Life from Fire in Buildings and Structures (the Life Safety Code)
102 Standard for Assembly Seating, Tents, and Membrane Structures
110 Standard for Emergency and Standby Power Systems

Volume 6

122 Standard for the Storage of Flammable and Combustible Liquids Within Underground Metal and Nonmetal Mines (Other than Coal)
220 Standard on Types of Building Construction
241 Standard for Safeguarding Construction, Alteration, and Demolition Operations
318 Standard for the Protection of Clean Rooms
321 Standard on Basic Classification of Flammable and Combustible Liquids
385 Standard for Tank Vehicles for Flammable and Combustible Liquids

Volume 7

407 Standard for Aircraft Fueling Servicing
493 Standard for Intrinsically Safe Apparatus and Associated Apparatus for use in Class I, II, and III, Division 1 Hazardous Locations [Discontinued see Underwriters' Laboratories, Inc. (UL), UL913, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations]
495 Code for the Manufacture, Transportation, Storage, and Use of Explosive Materials
496 Standard for Purges and Pressurized Enclosures for Electrical Equipment
498 Standard for Explosives Motor Vehicle Terminals
704 Standard Systems for the Identification of the Fire Hazards of Materials

Volume 8

1141 Standard for Fire Protection in Planned Building Groups
1221 Standard for the Installation, Maintenance, and Use of Public Fire Service Communication Systems

Volume 9

68 Guide for Explosion Venting
70B Recommended Practices for Electrical Equipment Maintenance
72G Guide for the Installation, Maintenance, and Use of Notification Appliances for Protective Signaling Systems
72H Guide for Testing Procedures for Local, Auxiliary, Remote Station, and Proprietary Signaling Systems
77 Recommended Practices on Static Electricity
80A Recommended Practice for Protection of Buildings from Exterior Fire Exposure
97M Standard Glossary of Terms Relating to Chimneys, Vents, and Heat-Producing Appliances

Volume 10

325M Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Materials
328 Recommended Practices for the Control of Flammable and Combustible Liquids and Gases in Manholes and Sewers

Volume 11

497A Recommended Practice for Classification of Class I Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
497M Manual for Classification of Gases, Vapors, and Dust for Electrical Equipment in Hazardous (Classified) Locations
802 Recommended Fire Protection Practice for Nuclear Research Reactors
901 Uniform Coding for Fire Protection
907M Manual on the Investigation of Fires of Electrical Origin

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CHARTER OF THE ELECTRICAL SAFETY COMMITTEE (ESC)

I. PURPOSE, OBJECTIVES, AND RESPONSIBILITIES

A. Provide the contractor or company with a competent technical resource for identifying, recommending resolution of, and communicating electrical safety issues.

B. Enhance electrical safety by reducing risk, mitigating hazards, and providing root cause analysis in electrical energy distribution and applications in R&D laboratories and other workplaces.

C. Identify the need for and establish new electrical safety initiatives and programs.

D. Develop, review, and approve electrical safety training programs.

E. Review all occurrence reports involving electrical issues, and participate in the root cause analysis process.

F. Participate in DOE electrical safety programs such as the DOE ESC, the development and maintenance of the DOE Electrical Safety Guidelines document, and the process for requesting and monitoring exemptions and waivers to guidelines.

G. The committee shall be responsible for implementation of this program.

II. MEMBERSHIP

A. Site management appoints the chair of the ESC and approves the charter.

B. The chair shall appoint a secretary.

C. The committee shall be made up of one member and an alternate appointed by each line organization or division and appropriate trades organization(s).

D. Advisors to the ESC shall attend and participate in committee meetings and activities. Advisors shall be line organization personnel who have special interests and/or knowledge concerning electrical safety. Advisors shall be approved by the committee.

E. The DOE area or field office appoints a representative to the ESC to coordinate electrical safety concerns involving the ESC and DOE.

F. Committee members shall be knowledgeable in electrical safety through education and/or experience and shall be actively pursuing electrical engineering, electrical safety, or R&D functions in the performance of their duties and shall be committed to the broad electrical safety concerns of the site and its employees.

III. COMMITTEE AUTHORITY

The ESC shall be the authority having jurisdiction (AHJ) for the implementation of the National Electrical Code, 29 CFR 1910, Subpart S, and 29 CFR 1926, Subpart K.

IV. OPERATIONAL GUIDELINES

A. The committee shall meet at least quarterly, and the meeting shall be called by the chair or by the secretary in the absence of the chair.

B. ESC bulletins and all revisions to the Electrical Safety Manual will be reviewed by the ESC.

C. Subcommittees to address particular areas of electrical safety may be formed at the direction of the chair, by vote of the committee, or by a voting member with the concurrence of the chair or committee. At least one ESC member shall serve on each subcommittee.

D. Designated alternate members shall vote in the absence of members and shall provide consultation and advice to individual members or the whole committee, as requested.

E. The chair shall appoint someone to serve as the chair in the chair's absence.

F. The secretary shall record and distribute ESC meeting minutes.

V. MANAGEMENT REVIEW

Conduct of the meetings and any resulting recommendations (with supporting documentation) will be communicated to ES&H management through the meeting minutes.